



American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP) Year 5 Update

Mark A. Wille, MD, FACS

August 23, 2019



COOK COUNTY
HEALTH

NSQIP Background

- ACS NSQIP is a nationally validated, risk-adjusted, outcomes-based program designed to measure and improve the quality of surgical care
- Built by surgeons for surgeons, ACS NSQIP provides participating hospitals with tools, analyses, and reports to make informed decisions about improving quality of care
- Peer-reviewed studies have demonstrated that ACS NSQIP is effective in improving the quality of surgical care while also reducing complications and costs
- See appendix for further details previously presented to QPS Committee

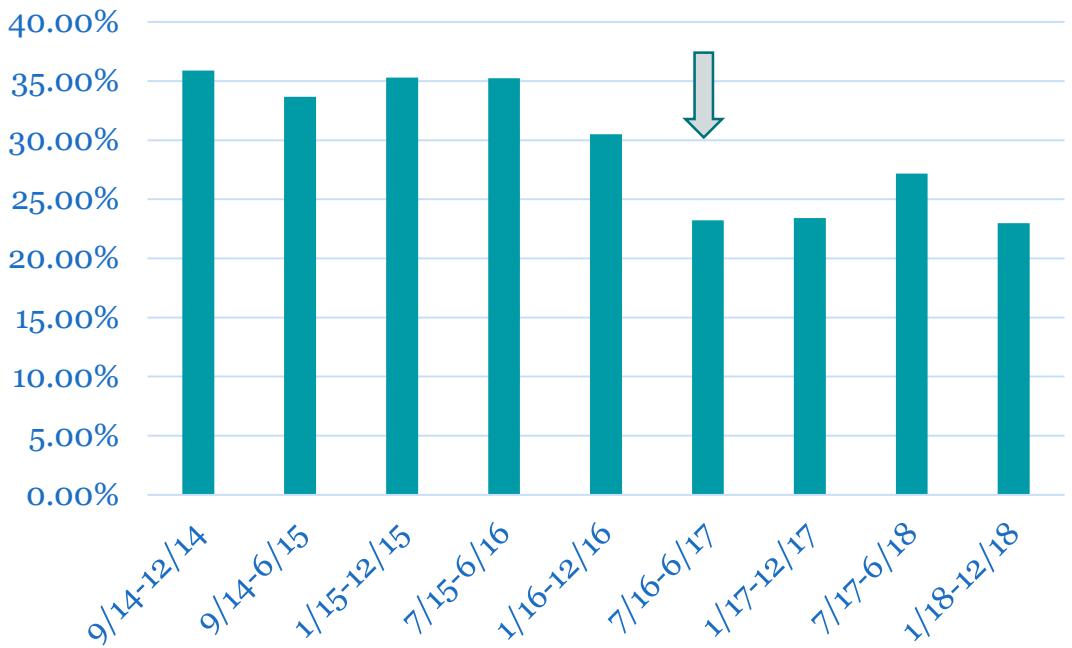
Cook County Health and ACS NSQIP

- John H. Stroger, Jr. Hospital (JSH) of Cook County joined ACS NSQIP in September 2014 as part of partnership with Blue Cross Blue Shield of Illinois and the Illinois Surgical Quality Improvement Collaborative (ISQIC).
- Team at this institution consists of:
 - Surgeon Champion: Mark A Wille, MD, FACS
 - Surgical Clinical Reviewer: Blessy Varghese, MSN, RN
- Per NSQIP protocol, systematic sampling of 30 cases over 8 days
- Receive semiannual report every 6 months from NSQIP
 - Contain 12 months data
 - Benchmarked against other NSQIP hospitals
 - Risk-adjusted

Institutional Projects

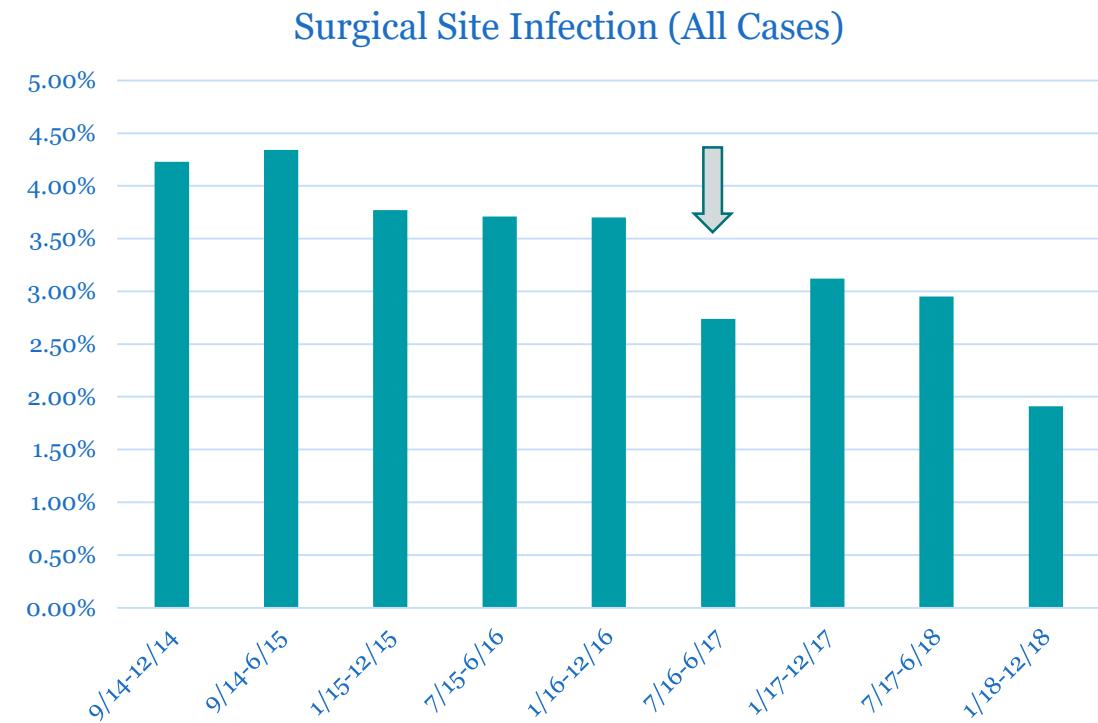
- Prolonged nil-per-os/nasogastric tube use (NPO/NGT) in Colectomy
 - Initial reports revealed occurrence near 35% (near 2x rate of average NSQIP hospital)
 - Assembled team and came up with treatment bundle (see appendix slide 37).
 - Staged implementation began approximately 8/2016
 - 1/2018-12/2018 semiannual report demonstrates rate under 23%

Prolonged NPO/NGT in Colectomy



Institutional Projects

- Surgical Site Infections
 - Initial reports revealed occurrence between 3.5-4.5% (near 1.5x rate of average NSQIP hospital)
 - Assembled team and came up with treatment bundle (see appendix slide 39).
 - Staged implementation began approximately 12/2016
 - 1/2018-12/2018 semiannual report demonstrates rate of 1.91%



Cook County Health and ACS NSQIP

Return on Investment

- ISQIC provides return on investment calculations for certain variables
- April 2019 report analyzed data from 7/2014-6/2015 compared to 1/2017-12/2017
- Time periods are before and after implementation of our institutional projects
- Relative change in rates calculated between two time groups
- Cost per complication calculated (estimated from 4 hospitals in a large metro health system adjusting for patient characteristics, procedure groupings, and site of care)
- Financial savings calculated



Cook County Health and ACS NSQIP

Cost of NSQIP Participation

- Surgical Clinical Reviewer: \$100,000
- ACS NSQIP Annual Fee: \$25,000
- Total Cost of NSQIP Participation: \$125,000

Cook County Health and ACS NSQIP

Return on Investment – Prolonged NPO/NGT after Colectomy

- Baseline rate: 33.66%
- 2017 rate: 23.42%
- Relative change in rates: 30%
- Estimated number of events avoided: 35
- Estimated cost per complication: \$10,205
- Estimated financial savings (annually): \$353,993

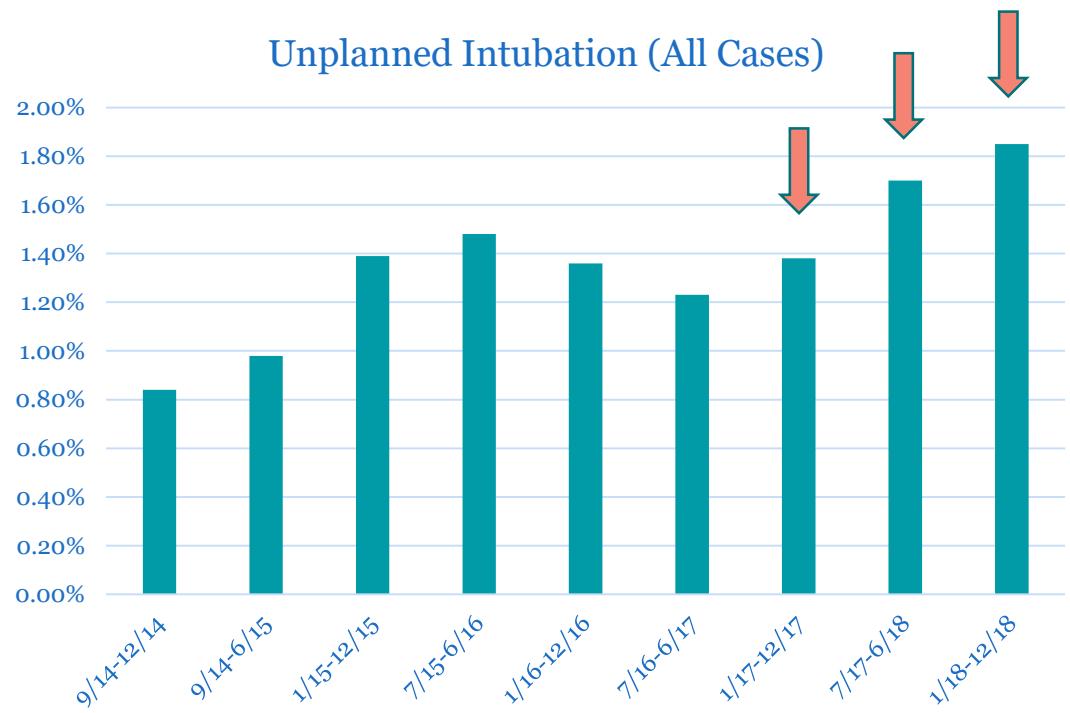
Cook County Health and ACS NSQIP

Return on Investment – Surgical Site Infections (Superficial)

- Baseline rate: 2.84%
- 2017 rate: 1.12%
- Relative change in rates: 61%
- Estimated number of events avoided: 96
- Estimated cost per complication: \$2,473
- Estimated financial savings (annually): \$237,210

Institutional Projects (New)

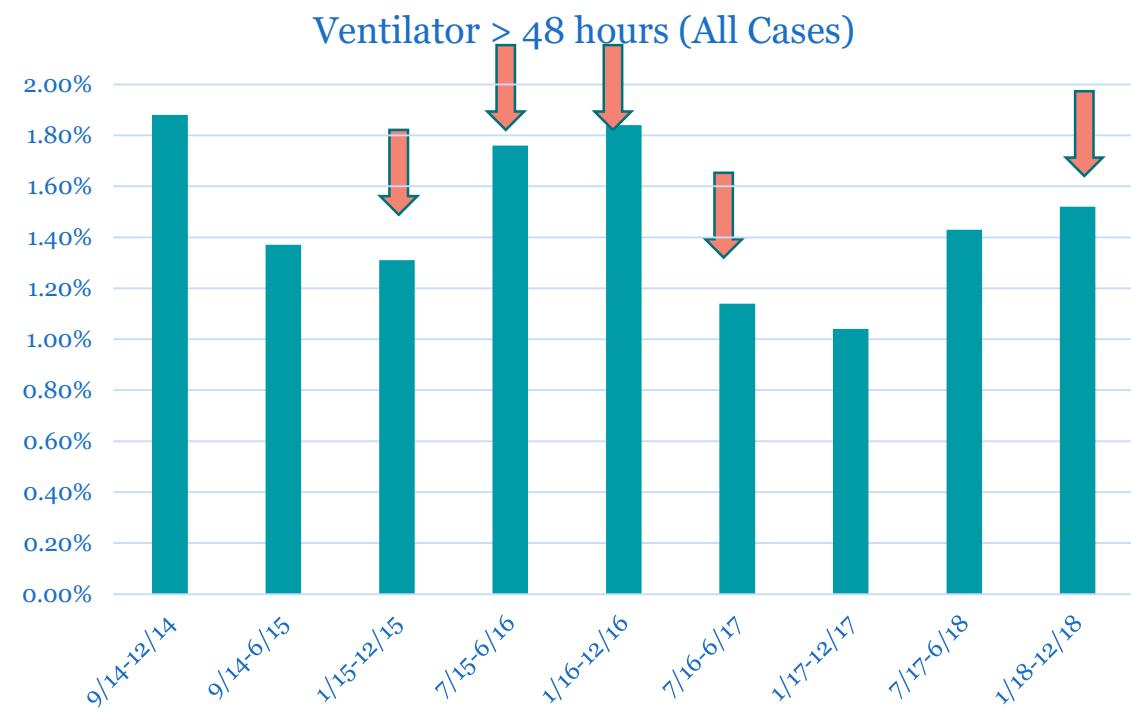
- Unplanned Intubation
 - Defined as placement of endotracheal tube or similar breathing tube and ventilator support which is not intended or planned
 - Serious adverse respiratory event
 - Increases risk of cardiac and pulmonary complications
 - Associated with higher healthcare costs
 - Associated with higher mortality
-  = statistical outlier



Institutional Projects (New)

- Ventilator >48 hours
 - Defined as total cumulative time of ventilator-assisted respirations exceeding 48 hours
 - Similar complications to and costs associated with unplanned intubation

-  = statistical outlier



Cook County Health and ACS NSQIP

Unplanned Intubation / Ventilator > 48 hours

- Many patients who met unplanned intubation occurrence also met ventilator > 48 hours occurrence
- Many are emergency cases, consisting of very ill patients
- Have previously met with Chair of Anesthesia, Chair of Surgical Intensive Care Unit
- Chart reviews performed
- No overarching theme was identified
- Currently planning multidisciplinary workgroup to address this problem

Cook County Health and ACS NSQIP

- Utilize clinically rigorous data abstraction methods
- Have identified several opportunities for improvement
- Ongoing projects, proven results
- Improving patient care
- Decrease institutional health care costs
- Worthwhile return on investment

Appendix



COOK COUNTY
HEALTH

NSQIP History

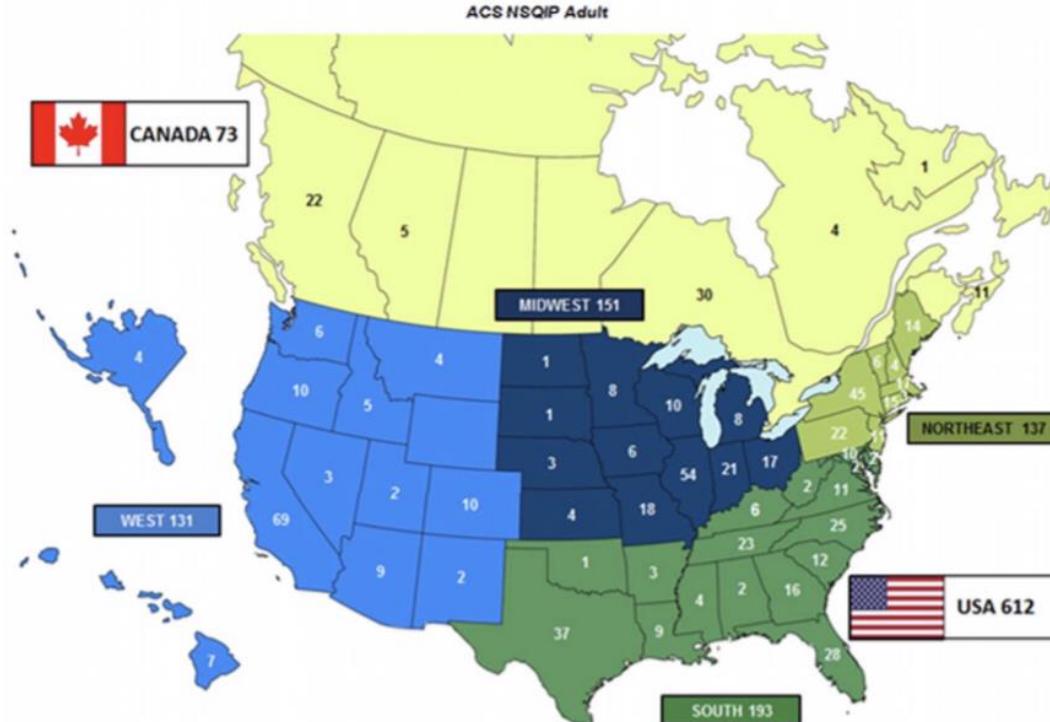
- Originated in the Veterans Health Administration (1991)
- ACS received funding to implement NSQIP pilot program in private sector hospitals (2001)
- ACS expanded program to additional private sector hospitals (2004)
- ACS launched different NSQIP participation options tailored to hospital needs (2011)
- John H. Stroger, Jr. Hospital of Cook County joined (2014)

NSQIP Benefits

- Satisfies the requirement for surgeons to be compliant with Maintenance of Certification (MOC), Part IV.
- The Joint Commission awards ACS NSQIP hospitals a Merit Badge on their Quality Check public website.
- CMS and ACS NSQIP are partnering to publicly report surgical outcomes on the Hospital Compare website.
- Participation meets new CMS surgical measure for 2014: Participation in a Systematic Clinical Database Registry for General Surgery.

Participating Hospitals

Number of Sites by State, Region, and Country Included in the January 2019 SAR (715)



ACS
NSQIP



**COOK COUNTY
HEALTH**

| | | |
|--|--|--|
|  AUSTRALIA 6 |  CUBA 1 |  GERMANY |
|  GUAM 1 |  ITALY 3 |  JAPAN 4 |
|  JORDAN 1 |  LEBANON 1 |  PHILIPPINES |
|  SAUDI ARABIA 3 |  SINGAPORE 1 |  SOUTH KOREA 2 |
|  SPAIN 1 |  UNITED ARAB EMIRATES 2 |  UNITED KINGDOM |

Program Overview

- Includes general, vascular, and subspecialty surgery cases
- Includes target cases
- Program uses clinical data (not administrative data)
- Outcomes assessed at 30 days after index surgery (inpatient or outpatient)
- Highly standardized and validated data definitions
- Data collected by a trained abstractor
- Advanced data analytics and hospital audits ensure data quality
- Provides data-driven tools for clinical decision making

NSQIP Case Selection

Systematic Sampling Process

- Cases are selected based on the NSQIP inclusion/exclusion criteria
 - Inclusion based on CPT® codes of major cases
 - General exclusion criteria
 - Pediatrics
 - Trauma and Transplant
 - ASA class 6
- An 8 day cycle yields on average 250 surgical procedures
 - Once exclusion criteria are applied to about 30% of the cases, there are enough cases remaining to fulfill the 30 cases per cycle NSQIP requirement



NSQIP Data Collection

Data analysis using standard methods

Custom reports from NSQIP

View data over time

Benchmarking (SAR or semi-annual report)

- Contain 1 year of data
- New SAR released every 6 months
- 6 month delay in receiving data (NSQIP takes time to perform statistical analysis and benchmarking)

Real-time Reports

- Not risk adjusted



Semi-annual Report (SAR) Content

Surgical Specialties

General surgery

Vascular

Colon Rectal

Cardiac

Gynecology

Neurosurgery

Orthopedics

Otolaryngology

Plastics

Thoracic

Urologic



COOK COUNTY
HEALTH

Type of Complication

Cardiac

Pneumonia

Respiratory failure

Venous thromboembolism

Renal failure

Urinary tract infection

Surgical site infection

Sepsis

Return to operating room

Readmission

Length of stay

Targeted Cases

Every case of the following is abstracted:

- Colectomy
- ventral hernia repair
- bariatric surgery
- Hysterectomy/myomectomy
- spine surgery
- brain tumor
- transurethral resection of prostate
- bladder suspension
- Prostatectomy
- Nephrectomy
- Cystectomy
- total knee and total hip arthroplasty
- hip fracture
- plastic flap
- breast reconstruction
- lung resection



Data Collection

- Preoperative data
- Demographics
- Clinical laboratory variables
- Surgical profile
- Clinical variables and complications
- Postoperative data
- 30-day outcomes (inpatient and outpatient)
- Custom fields allows sites to track their own variables of interest

Data Available to Hospitals

Workstation Reports

- Permits immediate evaluation on non-risk adjusted data and comparisons to similar types of hospitals
- Hospitals can download case details for selected cases
- Custom reports are available upon request

On-demand Benchmarking

- Risk-adjusted and smoothed rates and comparison to the average ACS NSQIP hospital
- Monitor performance changes over time
- Quality estimates for unique groups of patients

Semiannual Reports (SARs)

- Risk-adjusted and smoothed odds ratios and comparison to the average ACS NSQIP - modeled for a single data year using gold-standard methodology

Participant Use Files (PUFs)

- De-identified Research file contains all cases reported from 2005 to date

Interpretation of Results

“Exemplary” is assigned if the hospital is a low statistical outlier or is in the 1st quartile of adjusted OR percentiles.

“Needs Improvement” is assigned if the hospital is a high statistical outlier or is in the 4th quartile of adjusted OR percentiles.

“As Expected” is assigned if the hospital is neither a statistical outlier nor in the 1st or 4th OR quartile.

Complete explanations of statistical methods and how results should be interpreted are in the SAR and available on the Resource Portal.



Semiannual Reports

Data listed subsequently are for first eight semiannual reports

- Semiannual reports contain one year of data, released every six months (rolling basis) except 1st semiannual report – September 2014 – December 2014 (joined program in September 2014)

Odds Ratio listed

- Red+H indicates high statistical outlier (needs improvement)
- Green+L indicates low statistical outlier (exemplary)
- The Odds Ratio (OR) represents the odds that an outcome will occur given a particular exposure, compared to the odds of the outcome occurring in the absence of that exposure.

Abbreviations Definitions

GV = General and Vascular Surgery Cases

VTE = Venous Thromboembolism

UTI = Urinary Tract Infection

SSI = Surgical Site Infection

ROR = Return to Operating Room

GEN= General Surgery Cases

COLORECT = Colorectal Surgery Cases

VASC = Vascular Surgery Cases

SS = Subspecialty

NSG = Neurosurgery

URO = Urology

THOR = Thoracic Surgery

AAA = Aortic Abdominal Aneurysm

NPO/NGT = Nil-per-os/Nasogastric Tube

VHR = Ventral Hernia Repair

TURP = Transurethral Resection of Prostate

TKA = Total Knee Arthroplasty

THA = Total Hip Arthroplasty

PLAST = Plastic Surgery



ACS NSQIP Semianual Report Site Summary over Time

All Cases*

| | 07/13-06/14 | 01/14-12/14 | 07/14-06/15 | 01/15-12/15 | 07/15-06/16 | 01/16-12/16 | 07/16-06/17 | 01/17-12/17 | 07/17-06/18 | 01/18-12/18 |
|--------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| ALLCASES Mortality | | 1.37 | 1.48 | 1.15 | 0.93 | 1.32 | 1.26 | 0.96 | 1.04 | 1.02 |
| ALLCASES Morbidity | 1.45 H | 1.33 H | 1.16 | 1.29 H | 1.50 H | 1.11 | 1.02 | 1.04 | 0.91 | |
| ALLCASES Cardiac | 1.20 | 1.61 | 1.71 H | 1.56 | 1.88 H | 1.36 | 0.97 | 1.31 | 1.14 | |
| ALLCASES Pneumonia | 1.36 | 1.05 | 0.84 | 0.90 | 0.87 | 0.90 | 0.98 | 1.06 | 1.25 | |
| ALLCASES Unplanned Intubation | 1.03 | 1.14 | 1.54 | 1.51 | 1.50 | 1.52 | 1.58 H | 1.78 H | 1.75 H | |
| ALLCASES Ventilator > 48 Hours | 1.70 | 1.61 | 1.68 H | 2.13 H | 2.53 H | 1.80 H | 1.34 | 1.61 | 2.06 H | |
| ALLCASES VTE | 1.30 | 1.05 | 0.93 | 1.05 | 1.54 | 1.53 | 0.95 | 0.76 | 0.90 | |
| ALLCASES Renal Failure | 1.35 | 0.99 | 0.83 | 1.03 | 0.91 | 0.86 | 0.98 | 0.95 | 0.87 | |
| ALLCASES UTI | 0.86 | 0.71 | 0.63 | 0.95 | 1.47 | 1.08 | 0.75 | 0.77 | 0.98 | |
| ALLCASES SSI | 1.42 | 1.50 H | 1.27 | 1.32 | 1.47 H | 1.09 | 1.16 | 1.10 | 0.79 | |
| ALLCASES Sepsis | 0.89 | 1.01 | 1.19 | 1.05 | 1.11 | 0.81 | 0.70 | 0.81 | 0.62 | |
| ALLCASES C.diff Colitis | | | | | 1.09 | 0.84 | 0.85 | 1.34 | 1.39 | 0.98 |
| ALLCASES ROR | 1.27 | 1.25 | 1.16 | 1.11 | 1.09 | 1.01 | 0.99 | 1.06 | 1.05 | |
| ALLCASES Readmission | 1.24 | 1.22 | 1.11 | 1.17 | 1.06 | 1.01 | 1.15 | 1.07 | 1.04 | |

General/Vascular*

| | 07/13-06/14 | 01/14-12/14 | 07/14-06/15 | 01/15-12/15 | 07/15-06/16 | 01/16-12/16 | 07/16-06/17 | 01/17-12/17 | 07/17-06/18 | 01/18-12/18 |
|--------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| GV Mortality | | 1.05 | 1.11 | 1.12 | 1.05 | 1.08 | 1.01 | 0.87 | 0.90 | 0.92 |
| GV Morbidity | 1.33 | 1.24 | 1.11 | 1.22 | 1.29 | 0.96 | 0.88 | 0.93 | 0.80 | |
| GV Cardiac | 0.96 | 1.10 | 1.29 | 1.51 | 1.39 | 0.87 | 0.77 | 1.03 | 1.03 | |
| GV Pneumonia | 0.99 | 0.79 | 0.89 | 1.11 | 1.03 | 1.13 | 1.11 | 1.13 | 1.28 | |
| GV Unplanned Intubation | 0.92 | 1.05 | 1.64 | 1.67 H | 1.35 | 1.34 | 1.43 | 1.39 | 1.07 | |
| GV Ventilator > 48 Hours | 1.15 | 1.12 | 1.50 | 1.83 H | 1.51 | 1.22 | 1.23 | 1.18 | 1.05 | |
| GV VTE | 1.03 | 0.90 | 0.86 | 0.98 | 1.34 | 1.45 | 1.03 | 0.87 | 0.97 | |
| GV Renal Failure | 1.21 | 0.98 | 0.81 | 1.05 | 1.08 | 0.99 | 0.98 | 0.92 | 0.92 | |
| GV UTI | 0.92 | 0.78 | 0.69 | 0.80 | 1.04 | 0.91 | 0.72 | 0.77 | 0.86 | |
| GV SSI | 1.42 | 1.47 H | 1.26 | 1.31 | 1.34 | 0.94 | 0.95 | 1.03 | 0.79 | |
| GV Sepsis | 1.12 | 1.24 | 1.22 | 1.08 | 1.15 | 0.85 | 0.75 | 0.96 | 0.71 | |
| GV C.diff Colitis | | | | | 1.15 | 0.80 | 0.94 | 1.28 | 1.39 | 1.12 |
| GV ROR | 1.10 | 1.15 | 1.15 | 1.05 | 0.91 | 0.77 | 0.83 | 0.91 | 0.91 | |
| GV Readmission | 1.10 | 1.10 | 1.00 | 1.02 | 0.95 | 0.94 | 1.03 | 1.05 | 1.12 | |

General*

| | 07/13-06/14 | 01/14-12/14 | 07/14-06/15 | 01/15-12/15 | 07/15-06/16 | 01/16-12/16 | 07/16-06/17 | 01/17-12/17 | 07/17-06/18 | 01/18-12/18 |
|---------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| GEN Mortality | | 1.12 | 1.11 | 1.02 | 1.06 | 1.12 | 1.00 | 0.86 | 0.88 | 0.94 |
| GEN Morbidity | 1.43 | 1.31 | 1.10 | 1.15 | 1.25 | 1.00 | 0.91 | 0.92 | 0.82 | |
| GEN Cardiac | 1.00 | 1.21 | 1.33 | 1.47 | 1.55 | 0.97 | 0.84 | 1.11 | 1.07 | |
| GEN Pneumonia | 1.04 | 0.84 | 0.96 | 1.10 | 0.99 | 1.23 | 1.08 | 1.02 | 1.29 | |
| GEN Unplanned Intubation | 0.85 | 1.03 | 1.74 H | 1.89 H | 1.50 | 1.46 | 1.32 | 1.26 | 1.10 | |
| GEN Ventilator > 48 Hours | 1.22 | 1.20 | 1.53 | 1.90 H | 1.63 | 1.29 | 1.10 | 1.05 | 1.09 | |
| GEN VTE | 1.05 | 0.93 | 0.89 | 1.01 | 1.40 | 1.56 | 1.07 | 0.89 | 0.99 | |
| GEN Renal Failure | 1.26 | 1.03 | 0.83 | 1.04 | 1.08 | 1.06 | 1.02 | 0.96 | 0.94 | |
| GEN UTI | 0.92 | 0.80 | 0.72 | 0.85 | 0.98 | 0.83 | 0.74 | 0.79 | 0.88 | |
| GEN SSI | 1.51 | 1.49 H | 1.20 | 1.22 | 1.35 | 1.00 | 1.02 | 1.05 | 0.78 | |
| GEN Sepsis | 1.17 | 1.31 | 1.20 | 1.05 | 1.17 | 0.86 | 0.80 | 1.00 | 0.72 | |
| GEN C.diff Colitis | | | | | 1.22 | 0.83 | 0.82 | 0.99 | 1.26 | 1.16 |
| GEN ROR | 1.25 | 1.30 | 1.17 | 1.04 | 0.96 | 0.81 | 0.85 | 0.94 | 0.95 | |
| GEN Readmission | 1.12 | 1.16 | 1.05 | 1.04 | 0.97 | 0.95 | 1.06 | 1.10 | 1.18 | |





Colorectal*

| | 07/13-06/14 | 01/14-12/14 | 07/14-06/15 | 01/15-12/15 | 07/15-06/16 | 01/16-12/16 | 07/16-06/17 | 01/17-12/17 | 07/17-06/18 | 01/18-12/18 |
|--------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| COLORECT Mortality | | 1.05 | 0.95 | 0.85 | 0.88 | 0.97 | 0.96 | 0.88 | 0.88 | 0.95 |
| COLORECT Morbidity | | 1.40 | 1.39 | 1.11 | 1.08 | 1.22 | 0.90 | 0.91 | 1.00 | 0.82 |
| COLORECT Length of Stay | | 2.00 H | 2.04 H | 1.82 H | 2.06 H | 2.06 H | 1.17 | 0.73 | 0.86 | 0.93 |
| COLORECT Cardiac | | | | | | 1.71 | 1.15 | 0.98 | 0.99 | 0.85 |
| COLORECT Pneumonia | | 1.02 | 0.80 | 0.61 | 0.83 | 0.89 | 0.84 | 0.81 | 0.67 | 0.99 |
| COLORECT Unplanned Intubation | | 0.88 | 0.82 | 1.00 | 1.10 | 1.06 | 0.93 | 1.09 | 1.21 | 1.01 |
| COLORECT Ventilator > 48 Hours | | 1.20 | 1.23 | 1.15 | 1.19 | 1.05 | 0.95 | 1.03 | 1.15 | 0.94 |
| COLORECT VTE | | 1.01 | 1.00 | 1.00 | 1.04 | 1.27 | 1.14 | 0.91 | 0.84 | 0.85 |
| COLORECT Renal Failure | | 1.28 | 1.07 | 0.86 | 0.87 | 0.88 | 0.96 | 1.02 | | 0.99 |
| COLORECT UTI | | 0.92 | 0.89 | 0.90 | 0.82 | 0.96 | 0.92 | 0.76 | 0.96 | 1.01 |
| COLORECT SSI | | 1.63 | 1.84 H | 1.95 | 1.09 | 1.23 | 0.96 | 1.16 | 1.22 | 0.82 |
| COLORECT Sepsis | | 1.02 | 1.13 | 1.20 | 1.12 | 0.96 | 0.80 | 0.90 | 1.16 | 0.85 |
| COLORECT C.diff Colitis | | | | | | 1.15 | 1.00 | 0.72 | 0.97 | 1.35 |
| COLORECT ROR | | 1.33 | 1.42 | 0.97 | 0.83 | 1.07 | 0.96 | 0.96 | 1.04 | 0.96 |
| COLORECT Readmission | | 1.07 | 1.09 | 1.04 | 1.02 | 0.94 | 0.95 | 1.05 | 1.12 | 1.17 |

Vascular*

| | 07/13-06/14 | 01/14-12/14 | 07/14-06/15 | 01/15-12/15 | 07/15-06/16 | 01/16-12/16 | 07/16-06/17 | 01/17-12/17 | 07/17-06/18 | 01/18-12/18 |
|----------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| VASC Mortality | | 0.98 | 1.01 | 1.07 | 0.97 | 0.96 | 0.99 | 0.97 | 0.99 | 0.98 |
| VASC Morbidity | | 0.93 | 0.91 | 1.06 | 1.21 | 1.14 | 0.92 | 0.88 | 1.00 | 0.92 |
| VASC Cardiac | | 0.95 | 0.89 | 1.02 | 1.14 | 0.97 | 0.87 | 0.88 | 0.89 | 0.94 |
| VASC Pneumonia | | 0.95 | 0.87 | 0.87 | 1.04 | 1.05 | 0.89 | 1.04 | 1.14 | 0.94 |
| VASC Unplanned Intubation | | 1.05 | 1.02 | 0.94 | 0.90 | 0.90 | 0.90 | 1.17 | 1.13 | 0.97 |
| VASC Ventilator > 48 Hours | | 0.97 | 0.91 | 1.05 | 1.08 | 0.93 | 0.90 | 1.23 | 1.06 | 0.96 |
| VASC VTE | | 0.96 | 0.93 | 0.95 | 0.98 | 0.93 | 0.91 | 0.90 | 0.91 | 0.97 |
| VASC Renal Failure | | 0.97 | | 0.96 | 1.03 | 1.01 | 0.97 | 0.94 | 0.93 | 0.96 |
| VASC UTI | | 0.98 | 0.96 | 0.91 | 0.94 | 1.06 | 1.12 | 0.96 | 0.96 | 0.97 |
| VASC SSI | | 0.91 | 1.12 | 1.38 | 1.26 | 1.04 | 0.84 | 0.83 | 0.93 | 1.00 |
| VASC Sepsis | | 0.93 | 0.86 | 1.06 | 1.05 | 1.03 | 1.03 | 0.89 | 0.93 | 0.91 |
| VASC C.diff Colitis | | | | | 0.87 | 0.92 | 1.15 | 1.95 | 1.29 | 0.92 |
| VASC ROR | | | 0.85 | 0.86 | 1.01 | 1.00 | 0.87 | 0.80 | 0.87 | 0.88 |
| VASC Readmission | | 0.99 | 0.94 | 0.94 | 0.98 | 0.96 | 0.94 | 0.95 | 0.95 | 0.94 |

Measure*

| | 07/13-06/14 | 01/14-12/14 | 07/14-06/15 | 01/15-12/15 | 07/15-06/16 | 01/16-12/16 | 07/16-06/17 | 01/17-12/17 | 07/17-06/18 | 01/18-12/18 |
|---------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| MEASURE DSM | | 1.27 | 1.13 | 1.02 | 1.06 | 1.16 | 1.07 | 1.03 | 1.03 | 0.97 |
| MEASURE Elderly DSM | | 1.01 | 0.98 | 1.04 | 1.26 | 1.23 | 0.86 | 0.82 | 0.89 | 0.98 |
| MEASURE Colon DSM | | 1.22 | 1.06 | 0.84 | 0.87 | 0.94 | 0.76 | 0.93 | 1.00 | 0.78 |
| MEASURE Colon SSI | | 1.76 | 1.84 H | 1.33 | 1.21 | 1.26 | 0.91 | 1.27 | 1.38 | 0.84 |
| MEASURE Deep/OS SSI | | 1.00 | 1.10 | 1.05 | 1.08 | 1.26 | 1.31 | 1.42 | 1.13 | 0.68 |
| MEASURE UTI | | 0.95 | 0.80 | 0.61 | 0.99 | 1.70 H | 1.17 | 0.80 | 0.92 | 0.97 |
| MEASURE LEB DSM | | 0.93 | 0.89 | 0.99 | 0.95 | 0.98 | 0.99 | 0.94 | 0.95 | 0.96 |

Subspecialties*

| | 07/13-06/14 | 01/14-12/14 | 07/14-06/15 | 01/15-12/15 | 07/15-06/16 | 01/16-12/16 | 07/16-06/17 | 01/17-12/17 | 07/17-06/18 | 01/18-12/18 |
|----------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| SS Cardiac Mortality | | | 1.24 | 1.12 | 1.08 | 0.97 | 1.08 | | 1.00 | 1.06 |
| SS Cardiac Morbidity | | | 1.32 | 1.33 | 1.28 | 1.38 | 1.79 | 1.14 | 1.17 | 1.55 |
| SS Cardiac Cardiac | | | | | | 1.32 | 1.41 | 1.18 | 1.14 | 1.06 |
| SS Cardiac Pneumonia | | | 1.28 | 1.12 | 0.61 | 1.04 | 0.93 | 0.66 | 0.92 | 0.95 |
| SS Cardiac Unplanned Intubation | | | | | | 1.08 | 0.96 | 1.38 | | 1.16 |
| SS Cardiac Ventilator > 48 Hours | | | | | | 1.81 | 1.16 | 1.12 | 2.50 | 1.59 |
| SS Cardiac VTE | | | | | | 0.89 | 0.92 | 0.96 | | 0.83 |
| SS Cardiac Renal Failure | | | | | | 0.96 | 0.92 | 0.79 | | |
| SS Cardiac UTI | | | | | | 1.10 | 0.92 | 0.92 | 1.03 | 1.16 |
| SS Cardiac SSI | | | 0.94 | 0.95 | | 1.29 | 1.14 | 1.05 | 1.19 | 1.26 |
| | | | | | | | | | | 1.11 |

Subspecialties - continued*

| | 07/13-06/14 | 01/14-12/14 | 07/14-06/15 | 01/15-12/15 | 07/15-06/16 | 01/16-12/16 | 07/16-06/17 | 01/17-12/17 | 07/17-06/18 | 01/18-12/18 |
|-----------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| SS Plastic Morbidity | | 1.15 | 1.05 | 0.92 | 0.92 | 0.93 | 0.95 | 0.91 | 0.88 | 1.21 |
| SS Plastic Pneumonia | | | | | | | | | 0.99 | 0.99 |
| SS Plastic Unplanned Intubation | | | | | | 1.00 | | 1.00 | 0.99 | 1.00 |
| SS Plastic VTE | | | | | | | 0.99 | 0.98 | | 0.99 |
| SS Plastic UTI | | | | | | | | | | 0.99 |
| SS Plastic SSI | 0.94 | 0.93 | 0.95 | 0.95 | 0.96 | 0.96 | 0.90 | 0.89 | 1.26 | |
| SS Plastic Sepsis | | | | | 1.00 | 1.00 | 0.99 | 0.98 | 0.99 | 0.99 |
| SS Plastic C.diff Colitis | | | | | | 0.99 | | | | |
| SS Plastic ROR | 1.10 | 1.11 | 0.96 | 0.97 | 0.96 | 0.96 | 0.94 | 0.94 | 0.97 | |
| SS Plastic Readmission | | 1.04 | 1.08 | 1.12 | 0.97 | 0.97 | 0.96 | 0.96 | 0.97 | |
| SS Thoracic Mortality | 0.95 | 1.42 | 1.15 | 0.96 | | 1.12 | | | | 0.99 |
| SS Thoracic Morbidity | 1.11 | 0.99 | 0.93 | 0.85 | 1.14 | 1.28 | 1.21 | 1.14 | 1.04 | |
| SS Thoracic Cardiac | | | | | 1.09 | 1.07 | 1.12 | 1.12 | 1.18 | 0.93 |
| SS Thoracic Pneumonia | 1.21 | 1.26 | 1.02 | 0.86 | 1.16 | 1.11 | 0.97 | 1.13 | 1.02 | |
| SS Thoracic Unplanned Intubation | 0.96 | 1.02 | 1.01 | 0.95 | 1.07 | 1.34 | 1.09 | 1.26 | 1.27 | |
| SS Thoracic Ventilator > 48 Hours | 0.92 | 1.13 | 1.09 | 0.93 | 1.88 | 2.32 | 1.08 | 1.24 | 1.50 | |
| SS Thoracic VTE | 0.93 | 0.96 | 0.97 | 0.96 | 1.05 | | | 1.10 | 0.93 | |
| SS Thoracic Renal Failure | | | | | | 1.29 | 1.13 | 0.96 | | |
| SS Thoracic UTI | | | | | | 1.12 | 1.18 | 0.93 | 0.98 | |
| SS Thoracic SSI | | | | | | 0.90 | 0.91 | 1.04 | 1.02 | 1.03 |
| SS Thoracic Sepsis | | | | | 1.28 | 1.45 | 0.97 | 0.95 | 1.12 | |
| SS Thoracic C.diff Colitis | | | | | 0.99 | 0.99 | | | 0.96 | |
| SS Thoracic ROR | 0.92 | 0.88 | 0.87 | 0.86 | 1.05 | 1.16 | 1.18 | 1.58 | 1.20 | |
| SS Thoracic Readmission | | 1.23 | 1.01 | 1.05 | | 1.06 | 1.10 | 1.00 | 0.96 | |
| SS Urology Mortality | | | | | 0.99 | | | 1.09 | 0.99 | |
| SS Urology Morbidity | 1.17 | 1.03 | 0.84 | 0.98 | 1.19 | 1.05 | 0.91 | 0.84 | 0.98 | |
| SS Urology Cardiac | | | | | 0.97 | 0.96 | 1.15 | | 0.96 | |
| SS Urology Pneumonia | 0.98 | 0.95 | 0.92 | 0.87 | 0.93 | 0.93 | 0.95 | 0.88 | 0.93 | |
| SS Urology Unplanned Intubation | | | | | 0.99 | 0.98 | 1.08 | 1.25 | 0.98 | |
| SS Urology Ventilator > 48 Hours | | | | | | | 0.96 | 0.94 | 2.08 | |
| SS Urology VTE | | | | | | 1.13 | 1.03 | 1.06 | 1.02 | 0.96 |
| SS Urology Renal Failure | 0.99 | 0.89 | 0.83 | 0.90 | 0.96 | 0.97 | 0.98 | 0.97 | 0.99 | |
| SS Urology UTI | 0.87 | 0.78 | 0.91 | 1.01 | 0.79 | 0.87 | 0.75 | 0.62 | 1.14 | |
| SS Urology SSI | 2.00 | 1.70 | 1.04 | 1.08 | 1.55 | 1.63 | 1.29 | 1.18 | 1.01 | |
| SS Urology Sepsis | | | | | 1.02 | 0.89 | 0.91 | 0.87 | 0.94 | |
| SS Urology C.diff Colitis | | | | | 0.97 | 0.98 | 0.98 | 0.94 | 0.96 | |
| SS Urology ROR | 1.07 | 0.96 | 0.96 | 1.01 | 1.13 | 1.14 | 1.05 | 1.07 | 1.13 | |
| SS Urology Readmission | | | 0.99 | 0.96 | 0.95 | 0.89 | 1.00 | 1.03 | 1.00 | 1.01 |

Emergency*

| | 07/13-06/14 | 01/14-12/14 | 07/14-06/15 | 01/15-12/15 | 07/15-06/16 | 01/16-12/16 | 07/16-06/17 | 01/17-12/17 | 07/17-06/18 | 01/18-12/18 |
|----------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Emergency TGEN Mortality | | 1.03 | 1.01 | 0.90 | 0.92 | 0.98 | 0.94 | 0.97 | 0.91 | 0.91 |
| Emergency TGEN Morbidity | 1.03 | 1.25 | 1.23 | 1.09 | 1.04 | 1.08 | 1.24 | 1.27 | 1.27 | 1.00 |
| Emergency TCOLON Morbidity | 1.07 | 1.11 | 1.03 | 0.97 | 0.96 | 0.89 | 1.02 | 1.11 | 0.97 | |

Length of Stay*

| | 07/13-06/14 | 01/14-12/14 | 07/14-06/15 | 01/15-12/15 | 07/15-06/16 | 01/16-12/16 | 07/16-06/17 | 01/17-12/17 | 07/17-06/18 | 01/18-12/18 |
|---|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| GEN Pancreatectomy Length of Stay | | 1.43 | 2.14 | 1.82 | | 2.46 | 2.46 | | | |
| GEN Distal Pancreatectomy Length of Stay | | | | | | | | 1.56 | | |
| GEN Whipple Pancreatectomy Length of Stay | | | | | | | | 1.78 | 2.03 | |
| GEN Colectomy Length of Stay | 2.14 H | 2.09 H | 1.99 H | 2.07 H | 2.04 H | 1.22 | 0.74 | 0.84 | 0.94 | |
| GEN Proctectomy Length of Stay | 0.94 | 0.97 | | 1.34 | 1.32 | 0.91 | 0.96 | 1.17 | 1.10 | |
| GEN Hepatectomy Length of Stay | 0.90 | 0.89 | | 0.96 | 0.88 | | | | | |
| GEN Esophagectomy Length of Stay | | | | 0.75 | 1.25 | 1.73 | | 0.79 | 0.81 | |
| NSG Brain Tumor Length of Stay | 1.16 | 1.32 | 1.70 | 1.38 | 1.37 | 1.81 | 1.22 | 0.94 | 1.05 | |
| URO Nephrectomy Length of Stay | 1.04 | 1.04 | 1.88 | 2.18 | 2.09 | 1.41 | 1.00 | 0.82 | 0.66 | |



Length of Stay - continued*

| | 07/13-06/14 | 01/14-12/14 | 07/14-06/15 | 01/15-12/15 | 07/15-06/16 | 01/16-12/16 | 07/16-06/17 | 01/17-12/17 | 07/17-06/18 | 01/18-12/18 |
|--|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| URO Cystectomy Length of Stay | | | | | | | 0.87 | 0.80 | 0.92 | |
| THOR Lung Resection Length of Stay | | 0.85 | 0.50 | 0.72 | 0.71 | 0.71 | 1.17 | 1.02 | 0.60 | 0.41 |
| VASC AAA Length of Stay | | | 0.97 | 0.93 | | | | | | |
| VASC Aortoiliac (open) Length of Stay | | 1.04 | 0.96 | 1.24 | 2.10 | 1.38 | 0.92 | 0.82 | | |
| VASC Lower Extremity (open) Length of Stay | | 1.49 | 1.07 | 1.53 | 1.81 | 1.62 | 2.19 | 1.40 | 2.18 | 1.55 |

Targeted - General*

| | 07/13-06/14 | 01/14-12/14 | 07/14-06/15 | 01/15-12/15 | 07/15-06/16 | 01/16-12/16 | 07/16-06/17 | 01/17-12/17 | 07/17-06/18 | 01/18-12/18 |
|---------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| T GEN Colectomy Mortality | | 1.02 | 0.94 | 0.89 | 0.88 | 0.97 | 0.97 | 0.91 | 0.87 | 0.95 |
| T GEN Colectomy Morbidity | | 1.28 | 1.25 | 1.03 | 1.12 | 1.30 | 0.96 | 0.97 | 1.07 | 0.87 |
| T GEN Colectomy Cardiac | | 0.90 | 1.19 | 1.33 | 1.60 | 1.79 | 1.18 | 0.98 | 1.01 | 0.86 |
| T GEN Colectomy Pneumonia | | 1.07 | 0.82 | 0.60 | 0.86 | 0.93 | 0.91 | 0.87 | 0.72 | 0.99 |
| T GEN Colectomy Unplanned Intubation | | 0.92 | 0.96 | 1.02 | 1.16 | 1.05 | 0.94 | 1.13 | 1.18 | 1.01 |
| T GEN Colectomy Ventilator > 48 Hours | | 1.11 | 1.14 | 1.14 | 1.20 | 1.06 | 0.99 | 0.97 | 1.06 | 0.91 |
| T GEN Colectomy VTE | | | 0.97 | 0.97 | 1.03 | 1.15 | 1.04 | 0.96 | 0.82 | 0.85 |
| T GEN Colectomy Renal Failure | | 1.17 | 1.14 | | 0.91 | 0.91 | 0.97 | 1.02 | | 0.99 |
| T GEN Colectomy UTI | | 0.94 | 0.94 | 0.95 | 0.85 | 0.95 | 0.92 | 0.76 | 0.98 | 1.01 |
| T GEN Colectomy SSI | | 1.52 | 1.62 H | 1.18 | 1.08 | 1.17 | 0.97 | 1.22 | 1.22 | 0.89 |
| T GEN Colectomy Sepsis | | 1.08 | 0.96 | 1.04 | 1.16 | 1.07 | 0.85 | 0.98 | 1.17 | 0.89 |
| T GEN Colectomy C.diff Colitis | | | | | 1.11 | 1.05 | 0.79 | 0.97 | 1.19 | 1.05 |
| T GEN Colectomy ROR | | 1.25 | 1.39 | 0.95 | 0.86 | 1.10 | 1.01 | 1.00 | 1.08 | 0.99 |
| T GEN Colectomy Readmission | | 1.03 | 1.07 | 1.03 | 1.00 | 0.95 | 0.97 | 1.04 | 1.09 | 1.14 |
| T GEN Colectomy Anastomotic Leak | | 1.15 | 1.15 | 0.93 | 0.85 | 1.11 | 1.15 | 1.01 | 1.10 | 0.99 |
| T GEN Colectomy Prolonged NPO/NGT Use | | 1.99 H | 1.96 H | 2.18 H | 2.12 H | 2.02 H | 1.61 H | 1.56 H | 1.84 H | 1.67 |
| T GEN Proctectomy Mortality | | | | | 0.91 | | | | | |
| T GEN Proctectomy Cardiac | | | | | 0.98 | | | | | |
| T GEN Proctectomy Pneumonia | | | | | 0.97 | | | | | |
| T GEN Proctectomy Renal Failure | | | | | 0.99 | | | | | |
| T GEN Proctectomy UTI | | | | | 0.99 | | | | | |
| T GEN Proctectomy SSI | | | | | 0.92 | | | | | |
| T GEN Proctectomy Sepsis | | | | | 0.98 | | | | | |
| T GEN Proctectomy C.diff Colitis | | | | | 0.98 | | | | | |
| T GEN Proctectomy ROR | | | | | 0.98 | | | | | |
| T GEN Proctectomy Readmission | | | | | 1.00 | | | | | |
| T GEN VHR Mortality | | 0.97 | 0.99 | 0.95 | | 0.98 | 0.85 | | | |
| T GEN VHR Morbidity | | 0.96 | 0.97 | 1.03 | 1.03 | 1.03 | 1.02 | 1.06 | 1.01 | 0.92 |
| T GEN VHR Cardiac | | 1.18 | 1.03 | 0.92 | | | | 0.90 | 0.99 | 0.99 |
| T GEN VHR Pneumonia | | 1.11 | 1.08 | 1.01 | 1.04 | 0.84 | 1.24 | 1.27 | 0.92 | 0.98 |
| T GEN VHR Unplanned Intubation | | 1.00 | | 1.16 | 1.02 | 0.91 | 0.98 | 1.00 | | 1.00 |
| T GEN VHR Ventilator > 48 Hours | | 0.99 | 0.96 | 1.26 | 1.12 | | 0.75 | 0.80 | 0.95 | 0.99 |
| T GEN VHR VTE | | 0.99 | 0.93 | 0.93 | 1.11 | 1.02 | | | | |
| T GEN VHR Renal Failure | | | | | 1.17 | 1.19 | 0.95 | 1.06 | 1.00 | 0.99 |
| T GEN VHR UTI | | 0.99 | 0.93 | | 1.05 | 1.09 | 1.04 | 1.11 | 0.95 | 0.99 |
| T GEN VHR SSI | | 0.90 | 0.91 | 1.11 | 1.24 | 1.38 | 1.18 | 1.11 | 1.06 | 0.93 |
| T GEN VHR Sepsis | | 0.94 | 0.90 | 1.04 | 1.07 | 0.90 | 0.78 | 0.96 | 1.18 | 0.98 |
| T GEN VHR C.diff Colitis | | | | | 1.32 | | 0.96 | 0.87 | 0.96 | 0.99 |
| T GEN VHR ROR | | 0.95 | 0.92 | 1.11 | 1.08 | 0.89 | 0.70 | 0.70 | 0.90 | 0.98 |
| T GEN VHR Readmission | | 0.95 | 1.02 | 1.12 | 1.16 | 1.10 | 1.10 | 1.07 | 0.98 | 1.01 |
| T GEN Bariatric Morbidity | | | | | 1.00 | 0.98 | 0.98 | 0.96 | 0.99 | 0.96 |
| T GEN Bariatric Pneumonia | | | | | 1.00 | 1.00 | 0.99 | 0.99 | 1.00 | |
| T GEN Bariatric Ventilator > 48 Hours | | | | | 1.00 | | | | | |
| T GEN Bariatric VTE | | | | | 1.00 | 1.00 | 0.99 | 0.99 | 2.69 | 2.67 |
| T GEN Bariatric Renal Failure | | | | | 1.00 | | | | | |
| T GEN Bariatric UTI | | | | | 1.00 | 1.00 | 0.99 | 0.99 | 1.00 | 0.99 |
| T GEN Bariatric SSI | | | | | 1.00 | 0.99 | 0.98 | 0.98 | 1.00 | 0.98 |
| T GEN Bariatric Sepsis | | | | | 1.00 | 1.00 | 0.99 | 0.99 | 1.00 | 0.99 |





Targeted - General - continued*

| | 07/13-06/14 | 01/14-12/14 | 07/14-06/15 | 01/15-12/15 | 07/15-06/16 | 01/16-12/16 | 07/16-06/17 | 01/17-12/17 | 07/17-06/18 | 01/18-12/18 |
|--|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| T GEN Bariatric C.diff Colitis | | | | | 1.00 | | 1.00 | | | |
| T GEN Bariatric ROR | | | | | 1.00 | 1.00 | 0.99 | 0.97 | 0.99 | 0.98 |
| T GEN Bariatric Readmission | | | | | 0.99 | 0.98 | 0.97 | 0.92 | 2.56 | 2.35 |
| T GEN Thyroidectomy Morbidity | | | | | 0.92 | | | | | |
| T GEN Thyroidectomy Unplanned Intubation | | | | | 0.96 | | | | | |
| T GEN Thyroidectomy SSI | | | | | 0.97 | | | | | |
| T GEN Thyroidectomy ROR | | | | | 0.91 | | | | | |
| T GEN Thyroidectomy Readmission | | | | | 0.98 | | | | | |
| T GEN Esophagectomy Morbidity | | | | | 0.87 | | | | | |
| T GEN Esophagectomy Pneumonia | | | | | 0.78 | | | | | |
| T GEN Esophagectomy Unplanned Intubation | | | | | 0.99 | | | | | |
| T GEN Esophagectomy VTE | | | | | 1.00 | | | | | |
| T GEN Esophagectomy SSI | | | | | 0.89 | | | | | |
| T GEN Esophagectomy Sepsis | | | | | 0.93 | | | | | |
| T GEN Esophagectomy ROR | | | | | 1.15 | | | | | |
| T GEN Esophagectomy Readmission | | | | | 0.94 | | | | | |
| T GEN Appendectomy Mortality | | | | | 1.00 | | | | | |
| T GEN Appendectomy Morbidity | | | | | 1.04 | | | | | |
| T GEN Appendectomy Cardiac | | | | | 0.99 | | | | | |
| T GEN Appendectomy Pneumonia | | | | | 0.95 | | | | | |
| T GEN Appendectomy VTE | | | | | 0.98 | | | | | |
| T GEN Appendectomy Renal Failure | | | | | 0.99 | | | | | |
| T GEN Appendectomy UTI | | | | | 0.99 | | | | | |
| T GEN Appendectomy SSI | | | | | 1.16 | | | | | |
| T GEN Appendectomy Sepsis | | | | | 0.96 | | | | | |
| T GEN Appendectomy C.diff Colitis | | | | | 0.98 | | | | | |
| T GEN Appendectomy ROR | | | | | 1.09 | | | | | |
| T GEN Appendectomy Readmission | | | | | 0.91 | | | | | |

Targeted - Gynecology*

| | 07/13-06/14 | 01/14-12/14 | 07/14-06/15 | 01/15-12/15 | 07/15-06/16 | 01/16-12/16 | 07/16-06/17 | 01/17-12/17 | 07/17-06/18 | 01/18-12/18 |
|--|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| T GYN Hyst/Myom Mortality | | | | | | | 1.28 | 1.00 | 0.85 | 0.96 |
| T GYN Hyst/Myom Morbidity | | | | | | | | | | |
| T GYN Hyst/Myom Cardiac | | | | | | | 0.94 | 1.11 | 1.20 | |
| T GYN Hyst/Myom Pneumonia | | | | | | | 0.99 | 0.90 | | |
| T GYN Hyst/Myom Ventilator > 48 Hours | | | | | | | | | | 0.95 |
| T GYN Hyst/Myom VTE | | | | | | | 0.96 | 0.90 | 0.90 | |
| T GYN Hyst/Myom Renal Failure | | | | | | | 0.97 | | 0.93 | |
| T GYN Hyst/Myom UTI | | | | | | | 1.00 | 0.91 | 0.80 | |
| T GYN Hyst/Myom SSI | | | | | | | 1.34 | 1.02 | 0.74 | |
| T GYN Hyst/Myom Sepsis | | | | | | | 0.96 | 0.92 | 0.81 | |
| T GYN Hyst/Myom C.diff Colitis | | | | | | | 0.99 | 0.97 | 0.93 | |
| T GYN Hyst/Myom ROR | | | | | | | 1.23 | 1.20 | 0.95 | |
| T GYN Hyst/Myom Readmission | | | | | | | 1.15 | 1.09 | | |
| T GYN Hyst/Myom Intestinal Obstruction | | | | | | | 0.86 | 0.83 | 1.84 | |
| T GYN Hyst/Myom Anastomotic Leak | | | | | | | | | 2.30 | |

Targeted - NSG*

| | 07/13-06/14 | 01/14-12/14 | 07/14-06/15 | 01/15-12/15 | 07/15-06/16 | 01/16-12/16 | 07/16-06/17 | 01/17-12/17 | 07/17-06/18 | 01/18-12/18 |
|----------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| TNSG Spine Mortality | | | | | 0.99 | 0.99 | 0.99 | 0.98 | 0.99 | 1.00 |
| TNSG Spine Morbidity | | | | | 1.16 | 1.25 | 1.06 | 0.83 | 0.96 | 1.02 |
| TNSG Spine Cardiac | | | | | 0.96 | 0.98 | 0.97 | 1.00 | 0.99 | 0.97 |
| TNSG Spine Pneumonia | | | | | 0.92 | 0.95 | 0.94 | 0.94 | 0.95 | 0.98 |
| TNSG Spine Unplanned Intubation | | | | | 0.97 | 0.97 | 0.98 | 0.99 | 0.98 | 1.00 |
| TNSG Spine Ventilator > 48 Hours | | | | | 0.89 | 0.96 | 0.97 | 0.97 | 0.98 | 0.99 |
| TNSG Spine VTE | | | | | 0.91 | 1.10 | 1.14 | 0.92 | 0.95 | 0.99 |



Targeted - NSG - continued*

| | 07/13-06/14 | 01/14-12/14 | 07/14-06/15 | 01/15-12/15 | 07/15-06/16 | 01/16-12/16 | 07/16-06/17 | 01/17-12/17 | 07/17-06/18 | 01/18-12/18 |
|---|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| T NSG Spine Renal Failure | | | | | 0.97 | 0.98 | 1.00 | | 0.99 | 0.98 |
| T NSG Spine UTI | | | | | 1.57 | 1.92 | 1.18 | 0.95 | 1.17 | 1.19 |
| T NSG Spine SSI | | | | | 0.88 | 0.92 | 0.89 | 0.84 | 0.90 | 0.94 |
| T NSG Spine Sepsis | | | | | 0.97 | 0.95 | 0.95 | 0.94 | 0.96 | 0.98 |
| T NSG Spine C.diff Colitis | | | | | 0.97 | 0.98 | 0.99 | 0.98 | 1.00 | 0.99 |
| T NSG Spine ROR | | | | | 1.17 | 1.31 | 1.34 | 1.09 | 0.91 | 0.93 |
| T NSG Spine Readmission | | | | | 1.15 | 1.12 | 1.08 | 1.06 | 1.01 | 0.93 |
| T NSG Brain Tumor Mortality | | | | | 0.97 | | | 0.99 | 0.98 | 0.99 |
| T NSG Brain Tumor Morbidity | | | | | 1.15 | 1.06 | 1.02 | 1.03 | 1.11 | 1.07 |
| T NSG Brain Tumor Cardiac | | | | | | | | | 0.99 | |
| T NSG Brain Tumor Pneumonia | | | | | | | | 0.99 | 0.96 | 1.35 |
| T NSG Brain Tumor Unplanned Intubation | | | | | 0.98 | 1.16 | 1.14 | | | 1.14 |
| T NSG Brain Tumor Ventilator > 48 Hours | | | | | 1.85 | 1.23 | 0.93 | 0.96 | 1.06 | 1.17 |
| T NSG Brain Tumor VTE | | | | | | 1.05 | 1.15 | 0.96 | 0.98 | |
| T NSG Brain Tumor UTI | | | | | 0.96 | 0.98 | 0.99 | 0.97 | 0.95 | 0.98 |
| T NSG Brain Tumor SSI | | | | | 0.93 | 0.96 | 0.93 | 1.26 | 1.20 | 0.99 |
| T NSG Brain Tumor Sepsis | | | | | 0.94 | 0.98 | 0.96 | 0.95 | 0.96 | 0.98 |
| T NSG Brain Tumor ROR | | | | | 1.07 | 1.00 | 0.98 | 1.02 | 1.03 | |
| T NSG Brain Tumor Readmission | | | | | 1.00 | 1.00 | 1.00 | 1.06 | 1.03 | |

Targeted - Urology*

| | 07/13-06/14 | 01/14-12/14 | 07/14-06/15 | 01/15-12/15 | 07/15-06/16 | 01/16-12/16 | 07/16-06/17 | 01/17-12/17 | 07/17-06/18 | 01/18-12/18 |
|---|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| T URO TURP Mortality | | | | | 1.00 | | 1.00 | | | 1.00 |
| T URO TURP Morbidity | | | | | 0.91 | 0.94 | 1.06 | 0.98 | 0.97 | 0.97 |
| T URO TURP Cardiac | | | | | | | | | 0.99 | |
| T URO TURP Renal Failure | | | | | 1.00 | | | | | |
| T URO TURP UTI | | | | | 0.94 | 0.94 | 1.16 | 1.14 | 0.94 | 0.97 |
| T URO TURP Sepsis | | | | | 0.98 | 1.00 | 0.97 | | | 1.00 |
| T URO TURP ROR | | | | | 0.97 | 0.98 | | 1.09 | 0.98 | 0.99 |
| T URO TURP Readmission | | | | | 0.97 | 0.99 | 1.11 | 1.04 | | |
| T URO Bladder Suspension Morbidity | | | | | 0.99 | 0.98 | 0.99 | 0.96 | 0.91 | 0.89 |
| T URO Bladder Suspension UTI | | | | | 0.98 | | 1.00 | 0.96 | 0.95 | 0.91 |
| T URO Bladder Suspension ROR | | | | | 1.00 | | 1.00 | | | 0.99 |
| T URO Bladder Suspension Readmission | | | | | | | | | 0.96 | 0.98 |
| T URO Prostatectomy Morbidity | | | | | 0.93 | 1.41 | 1.42 | 0.91 | 0.85 | 1.09 |
| T URO Prostatectomy Cardiac | | | | | | 1.00 | | | 0.99 | |
| T URO Prostatectomy VTE | | | | | | | 1.05 | 1.02 | 1.12 | 0.91 |
| T URO Prostatectomy Renal Failure | | | | | | | 0.98 | | | 0.97 |
| T URO Prostatectomy UTI | | | | | 0.93 | 0.91 | 0.87 | 0.84 | 0.79 | 1.44 |
| T URO Prostatectomy SSI | | | | | 0.98 | 2.54 | 2.24 | 1.24 | 1.03 | 0.84 |
| T URO Prostatectomy Sepsis | | | | | 1.00 | | 0.97 | 0.90 | | 0.94 |
| T URO Prostatectomy ROR | | | | | | 1.65 | 1.13 | 0.97 | 0.84 | |
| T URO Prostatectomy Readmission | | | | | 0.99 | 1.12 | 1.08 | 0.99 | 1.06 | 1.05 |
| T URO Nephrectomy Mortality | | | | | 0.99 | 1.00 | 0.99 | 0.99 | | |
| T URO Nephrectomy Morbidity | | | | | 0.88 | 0.93 | 0.92 | | 0.98 | 0.96 |
| T URO Nephrectomy Cardiac | | | | | 0.95 | 0.99 | 0.98 | | 0.99 | |
| T URO Nephrectomy Pneumonia | | | | | 0.91 | 0.98 | 0.96 | 0.97 | 0.96 | 0.99 |
| T URO Nephrectomy Unplanned Intubation | | | | | 0.96 | 0.98 | | 0.99 | 0.99 | |
| T URO Nephrectomy Ventilator > 48 Hours | | | | | 0.87 | | | 1.00 | 0.99 | 0.99 |
| T URO Nephrectomy VTE | | | | | 0.99 | 0.98 | | 0.98 | | |
| T URO Nephrectomy Renal Failure | | | | | 0.96 | 0.96 | | 0.99 | 1.00 | |
| T URO Nephrectomy UTI | | | | | 0.96 | 0.96 | 0.99 | | 0.97 | 0.95 |
| T URO Nephrectomy SSI | | | | | 0.98 | 0.97 | 0.94 | | 0.99 | |
| T URO Nephrectomy Sepsis | | | | | 0.94 | 0.98 | | 0.98 | 0.96 | |
| T URO Nephrectomy C.diff Colitis | | | | | 0.99 | 0.99 | | | | 0.99 |
| T URO Nephrectomy ROR | | | | | | 1.17 | 0.98 | 0.97 | 0.99 | 0.96 |



Targeted - Urology - continued*

| | 07/13-06/14 | 01/14-12/14 | 07/14-06/15 | 01/15-12/15 | 07/15-06/16 | 01/16-12/16 | 07/16-06/17 | 01/17-12/17 | 07/17-06/18 | 01/18-12/18 |
|--|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| T URO Nephrectomy Readmission | | | | | 0.92 | 0.99 | 0.98 | 0.98 | 0.98 | 0.96 |
| T URO Cystectomy Mortality | | | | | | | | | | 1.00 |
| T URO Cystectomy Morbidity | | | | | | | 0.98 | 0.99 | 0.99 | |
| T URO Cystectomy Cardiac | | | | | | | | 0.99 | 1.00 | |
| T URO Cystectomy Pneumonia | | | | | | 1.00 | | | 1.00 | |
| T URO Cystectomy Unplanned Intubation | | | | | | | | | 1.00 | |
| T URO Cystectomy Ventilator > 48 Hours | | | | | | | | | | 0.99 |
| T URO Cystectomy VTE | | | | | | | 1.00 | 0.98 | 1.00 | |
| T URO Cystectomy Renal Failure | | | | | | | 1.00 | 0.98 | | |
| T URO Cystectomy UTI | | | | | | | 0.99 | 0.97 | 0.99 | |
| T URO Cystectomy SSI | | | | | | | 0.96 | 0.96 | 0.99 | |
| T URO Cystectomy Sepsis | | | | | | | 0.98 | 0.95 | 0.98 | |
| T URO Cystectomy C.diff Colitis | | | | | | | 1.00 | 0.99 | 0.99 | |
| T URO Cystectomy ROR | | | | | | | 0.99 | 0.98 | 0.98 | |
| T URO Cystectomy Readmission | | | | | | | 0.99 | 0.98 | 0.98 | |

Targeted - Orthopedic*

| | 07/13-06/14 | 01/14-12/14 | 07/14-06/15 | 01/15-12/15 | 07/15-06/16 | 01/16-12/16 | 07/16-06/17 | 01/17-12/17 | 07/17-06/18 | 01/18-12/18 |
|--|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| T ORTHO TKA Mortality | | | | | 1.00 | | | 1.00 | | 1.00 |
| T ORTHO TKA Morbidity | | | 0.99 | 0.97 | 0.98 | 0.98 | 0.96 | 0.97 | 0.99 | 1.00 |
| T ORTHO TKA Cardiac | | | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| T ORTHO TKA Pneumonia | | | 1.00 | 0.99 | 1.00 | 1.00 | 0.99 | | 1.00 | 1.00 |
| T ORTHO TKA Unplanned Intubation | | | | | 1.00 | | | 1.00 | | |
| T ORTHO TKA Ventilator > 48 Hours | | | | | | 1.00 | | | | |
| T ORTHO TKA VTE | | | 0.99 | 0.96 | 0.97 | 0.98 | 0.95 | 0.94 | 0.99 | 1.00 |
| T ORTHO TKA Renal Failure | | | | | | 1.00 | 1.00 | 0.99 | 1.00 | 1.00 |
| T ORTHO TKA UTI | | | 1.00 | 0.98 | 0.99 | 1.00 | 0.99 | 1.00 | 1.00 | 1.00 |
| T ORTHO TKA SSI | | | | | 0.98 | 0.97 | 0.98 | 0.96 | 0.96 | 0.99 |
| T ORTHO TKA Sepsis | | | 1.00 | | 0.99 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| T ORTHO TKA C.diff Colitis | | | | | | | | | | 1.00 |
| T ORTHO TKA ROR | | | 1.00 | 0.97 | 0.96 | 0.99 | 0.98 | 0.99 | 0.99 | 1.00 |
| T ORTHO TKA Readmission | | | 0.99 | 1.08 | 1.09 | 0.99 | 0.98 | 0.98 | 0.99 | 1.00 |
| T ORTHO THA Mortality | | | | | | 1.00 | 1.00 | 1.00 | | 1.00 |
| T ORTHO THA Morbidity | | | | | | 1.13 | 0.99 | 0.99 | 0.98 | 0.99 |
| T ORTHO THA Cardiac | | | | | | 0.97 | 1.00 | 1.00 | 1.00 | 1.00 |
| T ORTHO THA Pneumonia | | | | | | 0.98 | 1.00 | 1.00 | 0.99 | |
| T ORTHO THA Unplanned Intubation | | | | | | 1.42 | 1.00 | 1.00 | | 1.00 |
| T ORTHO THA Ventilator > 48 Hours | | | | | | | 1.00 | 1.00 | | 1.00 |
| T ORTHO THA VTE | | | | | | 0.99 | 0.99 | 0.99 | 0.99 | 1.15 |
| T ORTHO THA Renal Failure | | | | | | 0.97 | 1.00 | 1.00 | 0.99 | 0.99 |
| T ORTHO THA UTI | | | | | | 1.35 | 1.00 | 1.00 | 0.99 | 0.99 |
| T ORTHO THA SSI | | | | | | 1.23 | 0.99 | 0.98 | 0.96 | 0.98 |
| T ORTHO THA Sepsis | | | | | | 1.26 | 1.00 | 0.99 | 0.99 | 1.00 |
| T ORTHO THA C.diff Colitis | | | | | | 0.99 | 1.00 | | | |
| T ORTHO THA ROR | | | | | | 1.12 | 1.15 | 1.15 | 0.96 | 0.99 |
| T ORTHO THA Readmission | | | | | | 1.08 | 1.06 | 1.06 | 0.98 | 0.99 |
| T ORTHO Hip Fracture Mortality | | | | | | 1.00 | | | 0.99 | 0.92 |
| T ORTHO Hip Fracture Morbidity | | | | | | 0.99 | | | 1.07 | 1.02 |
| T ORTHO Hip Fracture Cardiac | | | | | | 0.99 | | | | 0.94 |
| T ORTHO Hip Fracture Pneumonia | | | | | | 1.00 | | | 0.99 | 0.95 |
| T ORTHO Hip Fracture Unplanned Intubation | | | | | | 0.99 | | | 1.00 | |
| T ORTHO Hip Fracture Ventilator > 48 Hours | | | | | | 1.00 | | | 1.00 | 0.99 |
| T ORTHO Hip Fracture VTE | | | | | | | | | 0.99 | 1.39 |
| T ORTHO Hip Fracture Renal Failure | | | | | | 1.00 | | | 1.00 | 1.00 |
| T ORTHO Hip Fracture UTI | | | | | | 0.99 | | | 1.39 | 1.22 |
| T ORTHO Hip Fracture SSI | | | | | | 0.99 | | | 0.99 | 0.98 |



Targeted - Orthopedic - continued*

| | 07/13-06/14 | 01/14-12/14 | 07/14-06/15 | 01/15-12/15 | 07/15-06/16 | 01/16-12/16 | 07/16-06/17 | 01/17-12/17 | 07/17-06/18 | 01/18-12/18 |
|-------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| T ORTHO Hip Fracture Sepsis | | | | | 0.99 | | | 1.00 | 0.98 | 1.00 |
| T ORTHO Hip Fracture C.diff Colitis | | | | | 1.00 | | | 0.99 | 0.98 | 0.98 |
| T ORTHO Hip Fracture ROR | | | | | 0.99 | | | 1.00 | 0.99 | |
| T ORTHO Hip Fracture Readmission | | | | | 0.99 | | | 1.03 | 1.00 | 1.07 |
| T ORTHO Hip Post-op Pressure Score | | | | | | | | | | 0.91 |
| T ORTHO Hip Post-op Delirium | | | | | | | | 1.27 | 0.90 | 0.79 |

Targeted - Plastic*

| | 07/13-06/14 | 01/14-12/14 | 07/14-06/15 | 01/15-12/15 | 07/15-06/16 | 01/16-12/16 | 07/16-06/17 | 01/17-12/17 | 07/17-06/18 | 01/18-12/18 |
|---|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| T PLAST Flap Morbidity | | | | | 1.13 | 1.11 | | 0.96 | 0.88 | 0.92 |
| T PLAST Flap Pneumonia | | | | | | | | | 0.99 | 0.98 |
| T PLAST Flap Ventilator > 48 Hours | | | | | | | | | | 0.98 |
| T PLAST Flap VTE | | | | | | | | | | 0.99 |
| T PLAST Flap SSI | | | | | 0.99 | 0.98 | | 0.91 | 0.87 | 0.97 |
| T PLAST Flap Sepsis | | | | | 1.00 | 0.99 | | 0.99 | 0.98 | 0.98 |
| T PLAST Flap ROR | | | | | 0.99 | 0.97 | | 0.91 | 0.92 | 0.89 |
| T PLAST Flap Readmission | | | | | | | | 0.98 | 0.95 | 0.99 |
| T PLAST Breast Reconstruction Morbidity | | | | | 0.99 | 0.99 | 0.99 | 0.98 | 0.95 | 0.97 |
| T PLAST Breast Reconstruction VTE | | | | | | | 1.00 | 1.00 | | |
| T PLAST Breast Reconstruction SSI | | | | | 1.00 | 1.00 | 0.99 | 0.98 | 0.97 | 0.97 |
| T PLAST Breast Reconstruction ROR | | | | | 0.99 | 0.98 | 0.99 | 0.98 | 0.97 | 0.99 |
| T PLAST Breast Reconstruction Readmission | | | | | 0.98 | 0.99 | 0.99 | 0.98 | 0.97 | 0.99 |

Targeted - Thoracic Lung Resection*

| | 07/13-06/14 | 01/14-12/14 | 07/14-06/15 | 01/15-12/15 | 07/15-06/16 | 01/16-12/16 | 07/16-06/17 | 01/17-12/17 | 07/17-06/18 | 01/18-12/18 |
|---|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| T THOR Lung Resection Mortality | | | | | 0.99 | 0.98 | 0.96 | | | |
| T THOR Lung Resection Morbidity | | | | | 0.93 | 0.89 | 0.94 | 0.95 | 1.03 | 0.97 |
| T THOR Lung Resection Cardiac | | | | | 0.98 | 0.98 | 0.99 | 1.39 | 1.24 | 0.99 |
| T THOR Lung Resection Pneumonia | | | | | 0.97 | 0.92 | 0.97 | 0.83 | 1.04 | 1.08 |
| T THOR Lung Resection Unplanned Intubation | | | | | 0.97 | | 0.98 | 0.92 | 1.10 | |
| T THOR Lung Resection Ventilator > 48 Hours | | | | | 0.95 | 0.95 | 0.98 | 1.23 | 1.21 | 0.91 |
| T THOR Lung Resection VTE | | | | | | | | | 1.10 | 0.93 |
| T THOR Lung Resection UTI | | | | | 0.92 | | | 0.96 | | 0.99 |
| T THOR Lung Resection SSI | | | | | 0.97 | 0.98 | 0.95 | 0.90 | 0.91 | 0.97 |
| T THOR Lung Resection Sepsis | | | | | 0.99 | | 0.99 | 0.96 | | 0.99 |
| T THOR Lung Resection ROR | | | | | 0.94 | 0.94 | 1.09 | 1.09 | 1.50 | 1.13 |
| T THOR Lung Resection Readmission | | | | | 0.96 | | 1.02 | 1.00 | 0.94 | 0.99 |

Prolonged NPO/NGT in Colectomy

- Prolonged NPO/NGT use is one of many potential occurrences in patients undergoing colectomy
- Occurrence indicates that bowel function has not returned after operation
- Prolonged NPO/NGT use leads to:
 - Increased length of stay
 - Reoperations
 - Decline in functional status
 - Increased discomfort and pain
 - Increased risk of pulmonary complications
 - Increased healthcare costs



Prolonged NPO/NGT in Colectomy Bundle

Intervention Bundle

- Preoperative Teaching
- Mechanical Bowel Preparation prior to surgery
- Preoperative oral antibiotic taken
- Clearfast or Carbohydrate drink
- Opioid-sparing medications/Intravenous Tylenol given preoperatively
- Epidural placed
- Opioid-sparing drips intraoperatively
- Goal-directed fluid management intraoperatively
- Limit post-operative fluids (bolus)
- Ambulation within 24 hours
- Feeding within 24 hour

A Guide to Bowel Surgery



COOK COUNTY HEALTH
& HOSPITALS SYSTEM
CCHHS



COOK COUNTY
HEALTH

Using NSQIP data to improve care: Surgical Site Infections

Second most common type of healthcare-associated infection (HAI) in U.S. Hospitals (290,000 per year)

Estimated cost: \$3.5-10 billion per year

Patient with SSI is:

- 5 times more likely to be admitted after discharge
- 2 times more likely to spend time in intensive care
- 2 times more likely to die after surgery

Kirkland KB, Briggs JP, Trivette SL, et al. The impact of surgical-site infections in the 1990s: attributable mortality, excess length of hospitalization, and extra costs. *Infection Control and Hospital Epidemiology*. 1999;20:725-30.



Surgical Site Infection (SSI) Bundle

Intervention Bundle

- Chlorhexidine Bath Written Instructions
- Chlorhexidine Bath Video
- Laparotomy Discharge Instructions
- Neomycin and metronidazole oral antibiotic preoperatively for colectomy
- Proper re-dosing of antibiotics
- Separate closing tray
- Normothermia at surgery completion
- Gown/Glove/Drape change during wound closure for gastrointestinal surgery
- Glove change during wound closure for gynecologic surgery